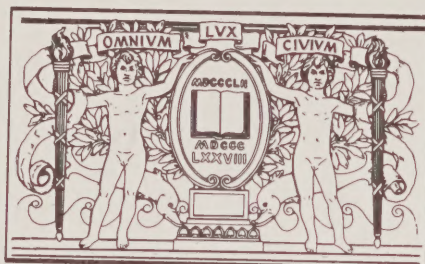


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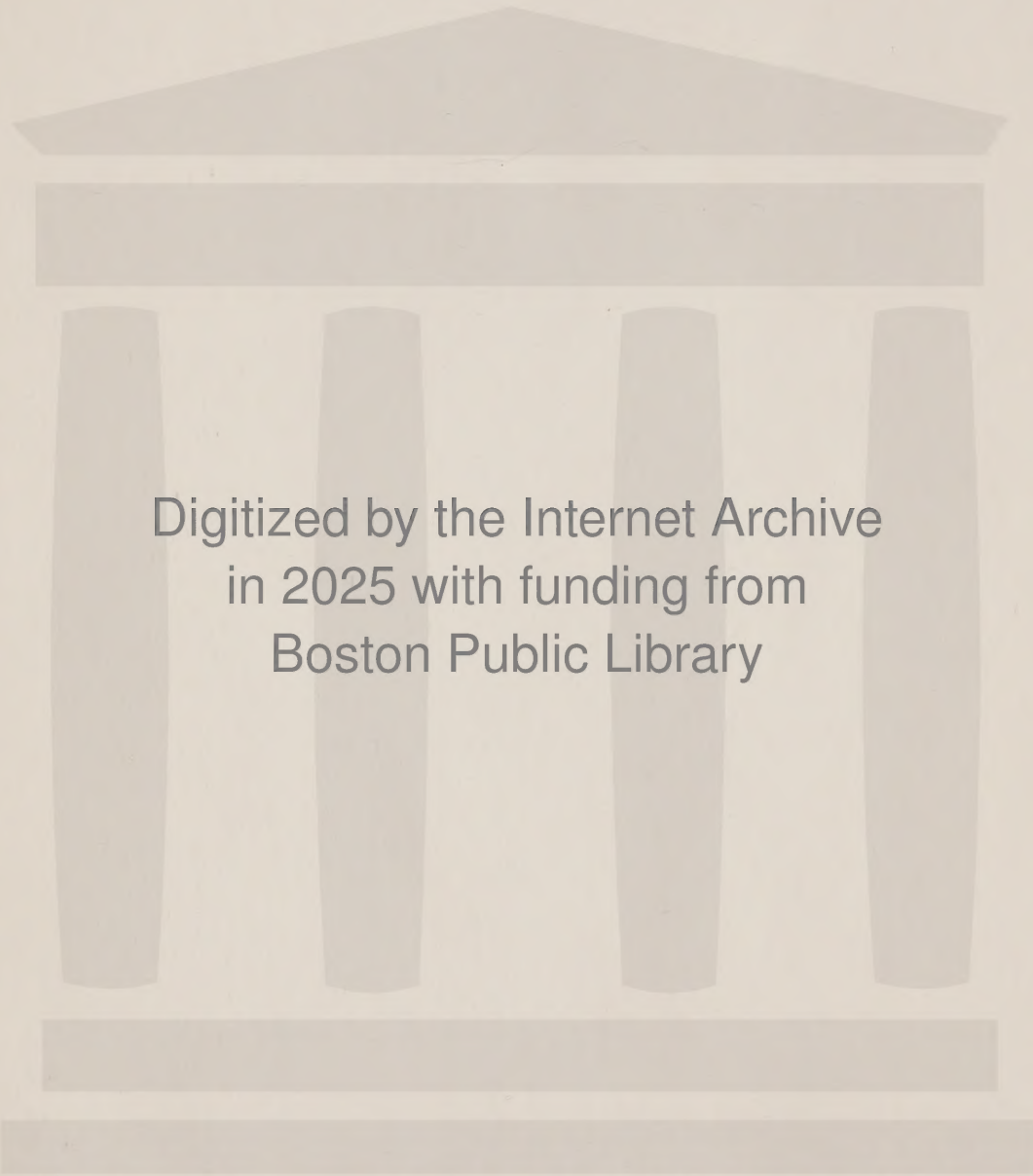
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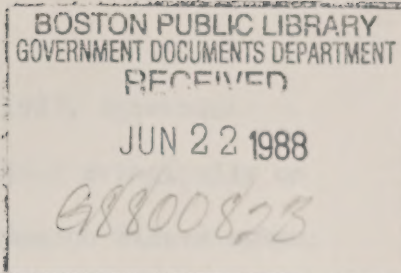




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Comments on the Latino
Political Action Committee
Critique
Of the Findings of the
Decennial Census Commission
and Proposal For
"Apportioning 1980-1985 Population Growth
To Boston Wards and Precincts"

Alexander Ganz, Assistant Director
Policy Development and Research
Boston Redevelopment Authority

August 5, 1987

Raymond L. Flynn, Mayor
City of Boston

Stephen Coyle, Director
Boston Redevelopment Authority

Alexander Ganz, Assistant Director
Policy Development and Research Department

Boston Redevelopment Authority
Board of Directors

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Michael J. Donlan, Member
Kane Simonian, Secretary

The Decennial Census Commission report, of May 15, 1987, determined Boston's 1985 population to be 601,095. The findings relied principally on the 1980 federal census, and data provided by the City (Boston Redevelopment Authority) on changes, 1980-1985, in the housing stock, vacancies, household size, and group quarters population, as modified by the Commission. The 1985 population was then allocated to wards utilizing the allocation of the 1980 federal census of population accepted by the federal district court in Latino Political Action Committee, Inc., v. City of Boston, as the most appropriate base for measuring the 1980-1985 change in population by ward. Since the Commission's findings that the 1980-1985 population growth city-wide was 65% of that claimed in the 1985 city census, this percentage was applied to the differential 1980-1985 growth in each of the 22 wards reported in the city census. Within each ward, the ward population growth percentage was applied equally to each precinct. The City accepted the Report of the Commission, and thanked the Commission for their work, and the opportunity to present substantive submissions that were reviewed by the Commission.

Alan Jay Rom, attorney for the Latino plaintiffs, advised Councillor Brian McLaughlin, Chairman of the Boston City Council Committee on Redistricting, in a letter of June 12, 1987, that, based on a "correct" distribution of the 1985 population of 601,095, "the bottom line is that the only change necessary when using the "correct" distribution formula is for a precinct to be transferred from District IV to District V. Nothing else has to change"

The scholarly report by Yohel Camayd-Freixas, PhD., for the Latino Political Action Committee, entitled "Apportioning 1980-1985 Population Growth

To Boston Wards And Precincts; A methodological correction to the Decennial Census Commission Report", dated June 11, 1987, presents "An Alternative Methodology" for allocating the 1980-1985 population increment, by race and ethnicity, utilizing vital statistics (births and deaths) and estimates of migration to calculate differential coefficients (rates) of population growth by race and ethnicity. These differential coefficients are then applied to the 1980 population, by race and ethnicity, by ward and precinct. The imaginative, and carefully executed exercise then yields a "corrected" 1985 population by ward and precinct. The weakness in the methodology is the calculation of "migration" as a residual (1980-1985 increase in city population minus net births), and the arbitrary allocation of this residual (38.5% white, 25% black, 25% Hispanic, 10% Asian, and 1.6% other). Despite the heroic supposition on migration, the conclusion is "only district 1 ... and district 5... violate this rule ("the general rule in redistributing is that district population must fall within 5% of the average for all districts")... it is quite easy to assign a few precincts from district 1 and thus achieve compliance with the district rule."Camayd-Freixas then presents an alternative to the modifications adopted by the Boston City Council.

In conclusion, the changes proposed by the Latino plaintiffs are minimal and based on an admittedly arbitrary supposition on migration by race and ethnicity, 1980-1985. The Boston Redevelopment Authority, for example, estimates a moderately different distribution of Boston's 1985 population by race and ethnicity.

A number of exhibits evidencing the principle themes in this analysis are attached.

M E M O R A N D U M

To: Stephen Coyle, Director

From: Alex Ganz, Assistant Director
Policy Development and Research

Date: May 15, 1987

Subject: Finding of the Governor's Commission on the City Census of a 1985
Population of 601,095

In defending Boston's Census tally of 620,889, the weight of very extensive work we carried out over the past year was designed to demonstrate that the City Census finding was plausible, based on extrinsic independent information on (1) the 1985 housing stock, from our Rolf Goetze report, (2) 1985 housing vacancies, occupied housing, and household size, from our household survey data, and (3) information from our survey of the group quarters population. Please see attached presentation of March 18, 1987, to the Governor's Commission, for example.

The report of the Governor's Commission adopted today unanimously (copy attached) outlines the rationale and conclusions, as follows. The top-down method of adjusting the city census could not be applied because of their finding of substantial flaws in the conduct of the city census as well as Secretary Connolly's audit. The Commission, therefore, adopted a bottom-up approach, starting with the 1980 federal decennial census and adjusting it upward utilizing BRA data on change in the housing stock, vacancies, household size, and group quarters population, as modified by the Commission.

The resulting total of 601,095 represents approximately 65% of the 1980-1985 growth the City claimed. The Commission then allocated this total by multiplying the 1985 City Census increment (in comparison with 1980) by the ratio of 0.65.

The conclusion of the Commission's meeting today was a love-fest all around, with everybody commending each other. Al Wallis, Corporation Counsel's Office, thanked the Commission.

Attachments (2)

WILLIAM ALONSO
Saltonstall Professor of Population Policy
Center for Population Studies
Harvard University
Cambridge, MA 02138
(617) 495-3002

May 14, 1987

Prof. Tunney Lee
Decennial Census Commission
on the Boston Decennial Census
Department of Urban Studies
MIT
Cambridge MA 02139

Dear Tunney:

I have had a chance to read the draft of the Commission's report, and I congratulate you and your fellow Commission members on having done an excellent and even-handed job on a difficult assignment.

It is unfortunate but clear that the 1985 Boston Census, as it was carried out, suffered from severe procedural and conceptual flaws, so that the numbers it reports are subject to considerable error. Moreover, contextual evidence argues that the total population of the city at that time was in the vicinity of 600,000, rather than the 620,889 reported.

It is, of course, impossible to go back in time and count directly the population as it was two years ago. To some degree, this is what the Secretary of the Commonwealth's audit attempted to do; but its result was also flawed and could not produce a remedy to cure the city's censal data.

Accordingly, the procedure followed seems to me sound, sensible, and professional. This procedure is one of synthesis, combining fairly reliable data from various sources, principally the inventory of housing stock, the vacancy rate, and the average size of households in the city. Moreover, the Commission's estimate uses for the most part data generated by Boston itself through the Boston Redevelopment Authority, which is an excellent professional organization.

Sincerely,

Will Alonso

THE REPORT OF
THE DECENNIAL CENSUS COMMISSION
TO
THE SECRETARY OF THE COMMONWEALTH OF MASSACHUSETTS
ON THE
BOSTON DECENNIAL CENSUS OF JANUARY 1, 1985

May 15, 1987

Chairperson Tunney F. Lee
Commissioner Philip L. Clay
Commissioner John W. Delaney
Commissioner Paul Guzzi
Commissioner Eunice P. Howe

Counsel to the Commission
Barry B. White, Esquire
Timothy G. Caron, Esquire
Foley, Hoag & Eliot

By utilizing a bottom-up methodology based on federal census data and BRA housing data, the Commission has come to the conclusions set forth below.

The Commission's Specific Findings

1. The Commission concludes that the total number of housing units in 1985 in the City of Boston was 249,197. This number was derived from the BRA's 1985 housing inventory study, (Comm'n Doc. 7, Exh. H, p. 1 and tables) which used as a basis the 1980 Census Bureau's number of 241,444 total housing units and added to that number new construction (5,570 units) and conversions (4,441), and subtracting estimated demolition (1,960 units) (Comm'n Doc. 7, Exh. H tables). No data or testimony before the Commission challenge this number, and all experts who have made projections, including Mr. Masnick (Comm'n Doc. 40, p. 2) and Mr. Ganz (for the City) (Comm'n Doc. 80, Exh. 4, p. 2), have utilized this number as a correct designation of total housing units in the City. The Commission, based on all available evidence, finds the BRA's 1985 estimate of 249,197 housing units is accurate.

2. The Commission concludes that the correct gross vacancy rate for the City of Boston in 1985 was 8.17%. The 1980 federal census found a 9.5% gross vacancy rate (vacancies including units that are boarded-up or abandoned) and a 7.5% net vacancy rate (including only habitable units) in the City (Comm'n Doc. 80, Exh. 3, tables, p. 3). The 1980 BRA survey found a 5.0% vacancy rate. (Comm'n Doc. 85, Exh. 7A, p. 40). The record is not clear

as to whether this is a gross or net vacancy rate. The Commission will accept the proposition that the rate represents net vacancies, as Mr. Ganz states on behalf of the City (Comm'n Doc. 80, Exh. 3, p. 2). It is understood, however, that the 1985 BRA survey methodology produced a gross vacancy rate of 6.1% and a net vacancy rate of 4.3% for Boston (Comm'n Doc. 80, Exh. 3, tables, p. 1).

The discrepancy between the 1980 federal census vacancy rate and the 1980 housing survey vacancy rate is largely the result of sample bias in the BRA survey methodology. The extent of statistical bias in the BRA survey in 1980 can be measured by comparing the BRA's vacancy rate to the vacancy rate found by the more accurate 1980 federal census data. Since the gross vacancy rate found by the federal census was 9.5%, and the net vacancy rate estimated by the BRA 1980 survey was 5.0%, the resulting ratio is 5.0%: 9.5%.

BRA materials indicate that the methodology used in its 1985 housing survey is substantially identical to the methodology used in the 1980 survey. No methodological attempts were made in 1985 to reduce the statistical bias in vacancy rates that existed in the 1980 survey. Accordingly, the Commission finds that a similar statistical bias exists in the 1985 BRA survey. To calculate the gross vacancy rate for 1985, the net vacancy rate found by the BRA in 1985 (4.3%) should be increased by the statistical bias ratio found for 1980 ($5.0\%: 9.5\% = 4.3\%: 8.17\%$). The gross vacancy rate of 8.17% is consistent with extrinsic evidence suggesting a decline in vacancy rates in Boston between 1980 and 1985.

3. The Commission finds that the number of occupied housing units in the City in 1985 was 228,838. Occupied housing units are determined by multiplying the total number of housing units by the gross vacancy rate. Incorporating the Commission's prior findings of 249,197 total housing units and a gross vacancy rate of 8.17%, there are a total of 228,838 occupied housing units. This shows an increase in the number of occupied housing units since 1980 (218,457) (Comm'n Doc. 38, Exh. 1A, Table 1), and thus is consistent with available extrinsic evidence.

4. The Commission finds that the average household size in Boston was 2.41. The 1980 federal census found an average household size (i.e., the mean number of persons in each occupied housing unit citywide) of 2.40 (Comm'n Doc. 38, Exh. 1A, Table 1). All evidence indicates that since 1980, the average household size in Boston has remained relatively stable (Comm'n Doc. 80, Exh. 4, p. 4; Comm'n Doc. 85, Exh. 7B, p. 9). The 1985 BRA household survey measured an average household size of 2.45, without accounting for sampling bias in the survey.⁵⁷ To adjust for this bias, the Commission calculated weighted averages for the survey respondents and nonrespondents. By assuming that nonresponding households with a size of four persons or more were proportional to responding households with four persons or more, the weighted mean household size was calculated to be 2.41

⁵⁷ The survey sample is slightly biased towards higher household size, which accounts for the discrepancy. In the household survey, a disproportionate percentage of nonrespondents to the survey came from one- and two-person households, whereas a disproportionate percentage of respondents to the survey came from households of more than two persons (Comm'n Doc. 38, Exh. 1A, Table 5).

(Comm'n Doc. 78). In a BRA estimate in the fall of 1985, Mr. Ganz of the BRA estimated a 2.4 mean household size for 1985 (Comm'n Doc. 15, Exh. 16). Moreover, the report describing the BRA housing survey findings estimated the average household size to be 2.4, unchanged from 1980 (Comm'n Doc. 85, Exh. 7B, p. 9). This and other extrinsic evidence confirms the Commission's finding. By multiplying the number of occupied housing units (228,838) by the average household size of 2.41, the household population in 1985 was 551,500.

5. The Commission finds the population in group quarters on January 1, 1985 to be 48,894. The definition of group quarters for federal census purposes is the sharing of living quarters by ten or more unrelated persons (Comm'n Doc. 38, Exh. 1A, p. 10). The 1980 federal census counted 39,518 persons in group quarters in Boston (Comm'n Doc. 77). The BRA household surveys do not include group quarters (Comm'n Doc. 38, Exh. 1A, p. 10). The BRA is currently conducting a group quarters survey, but the results of that survey are not yet complete (Comm'n Doc. 38, Exh. 1D). The City's formal submission (Comm'n Doc. 6, p. 6) reported a group quarters population of 49,877. Subsequent information provided by the City, however, suggests that this number is without foundation, and that the City had not adhered to the federal census definition of group quarters in arriving at its figure.⁵⁸

⁵⁸ Apparently, the number represents an incomplete count of multiple listing inhabitants, rather than group quarters, as discussed at ____.

In a revised submission, based on incomplete returns from the BRA group quarters survey, Mr. Ganz estimated that the actual group quarters increase for 1980-1985 was 20% (Comm'n Doc. 80, Exh. 4, p. 5). The Commission has no other estimate of the group quarters population for 1985. Thus, the Commission will accept Mr. Ganz's estimate of a 20% increase in group quarters population since 1980, or 8,096. When added to the group quarters count of the 1980 federal census (39,518), the group quarters population is 47,614.

The group quarters number should also include homeless persons living in shelters.⁵⁹ Both the Massachusetts Constitution and the Secretary's census instructions provide that the homeless should be counted. Mr. McElligott testified that the City did not include, in its census count, homeless shelters

⁵⁹The Massachusetts Constitution., Art. 101, §1, as amended by Art. 109 provides that "every person shall be considered an inhabitant of the city or town of his usual place of residence in accordance with standards used by the United States from time to time in conducting the federal census . . . subject to such exceptions as the general court may provide by law." Standards for the federal census are set by the Census Bureau, which has traditionally sought to count not only those persons whose usual place of residence is within a particular state on the census date, but also those persons present in the state who have no usual place of residence. See Borough of Bethel Park v. Stans, 449 F.2d 575, 578 (3d Cir. 1971). Moreover, M.G.L. c.9, §7 provides that the state decennial census shall be compiled and reported "in accordance with [the Secretary's] instructions." The Secretary's Census Supervisor Manual (Comm'n Doc. 16), page 2, states that "[p]ersons without a usual place of residence . . . should be counted where they happened to be staying," and the Secretary's Instructions to Census Takers (Comm'n Doc. 16), page 6, directs enumerators to "[c]ount as inhabitants all persons you find in your area who have no ther place they consider home. Persons in construction camps, missions, one-night lodging houses, campsites, etc., who have no other place they consider home, should be counted where you find them." Therefore, both the standards used for conducting the federal census and the instructions established by the Secretary for the state decennial census require that the homeless be counted where they are found.

except the Pine Street Inn and Long Island Hospital (Comm'n Doc. 31, p. 95). On September 30, 1986, the City conducted a census of the homeless, which counted a total homeless population in Boston of 2,863 (Comm'n Doc. 35).⁶⁰ By deducting the number of homeless persons found in Pine Street Inn (522) and Long Island Hospital (360)⁶¹ in the census of the homeless, the Commission finds that there are 1,981 homeless persons on the street and in shelters. The 701 homeless persons counted on the street in the census of the homeless will be counted separately. This leaves 1,280 uncounted homeless in shelters. Thus, the total group quarters population, including the homeless in shelters, is 48,894.

6. The Commission finds that the census should include 701 homeless persons not in shelters. The City has stated that it did not include in its January 1, 1985 census count any homeless persons on the street (Comm'n Doc. 31, p. 95). The only data

⁶⁰It is impossible for the Commission to determine whether any change in the homeless population occurred between January 1, 1985 (census day) and the census of the homeless on September 30, 1986. Thus, the Commission will assume that the number of homeless persons counted in September 1986 is the same number who would have been counted on January 1, 1985.

⁶¹Mr. McElligott testified that only "permanent patients" at Long Island Hospital were counted in the 1985 city census (Comm'n Doc. 31, p. 95). It is unclear whether the 360 persons counted at Long Island Hospital in the 1986 census of the homeless (Comm'n Doc. 35) are "permanent patients" or others. In any case, the City reportedly counted 768 homeless persons at Pine Street Inn in the 1985 decennial census (Comm'n Doc. 76), a number in excess of the homeless at Pine Street Inn counted in the census of the homeless (522). Accordingly, for consistency, the Commission has assumed that the Pine Street Inn and Long Island Hospital homeless were accounted for in the 1985 City census.

available on the number of homeless on the streets is the City's count of the homeless described above (Comm'n Doc. 35). The Commission accepts as reasonable Ms. Tracy's count of 701 homeless persons as inhabitants of the City.

7. The Commission finds that the total population of the City of Boston on January 1, 1985 was 601,095. This shows a 6.4% growth over the 1980 federal census. The Commission determined this number by multiplying the average household size by the number of occupied housing units in the City, then adding the group quarters population and the homeless. The Commission finds that this number is derived from the most reliable data available to the Commission. It should be emphasized that this population figure does not replace the City's census, but rather, it measures the extent of the City's overcount in conducting the 1985 census. The Commission believes, based on all available evidence, that this is the correctly enumerated population of the City of Boston on January 1, 1985.

E. ALLOCATION OF THE CITY POPULATION TO WARDS AND PRECINCTS

The Massachusetts Constitution requires that the decennial census for each city and town be reported by wards and precincts.⁶² The City has 22 wards and 252 precincts (see Comm'n Doc. 81). The Commission recognizes the complexity and difficulty of accounting for the population of each subdivision of the City. While the statute establishing the Commission does not explicitly state that the Commission must report the census

⁶²Mass. Const., Art. 101 §1.

count for each of the City's wards and precincts, the Commission believes that such a report is incumbent upon it to fulfill its mandate to "determine and verify," and that not to do so would leave the City, the Secretary and the General Court with an incomplete and unusable census count.

The 1980 federal census was not compiled by ward and precinct. To determine the proper allocation of population to each ward and precinct, the Commission has relied in part upon the allocation of the 1980 federal census population to wards and precincts used by the federal district court in Latino Political Action Committee, Inc., v. City of Boston.⁶³ In Latino, the Court was presented with a BRA report of the breakdown of the 1980 federal census by ward and precinct (Comm'n Doc. 23, Table C). The BRA report's allocation was based upon census tract data compiled by the Census Bureau in the 1980 census. As this BRA report is the only ward and precinct allocation based on the 1980 census, and as it was relied upon by the United States District Court for Massachusetts, the Commission also relies on it.

To account for population shifts since 1980, the Commission considered a comparison of BRA housing survey data measuring growth for each of the 16 BRA planning districts between 1980 and 1985. After accounting for geographic differences between the BRA planning districts and the wards, the growth in population measured in each ward between 1980 and 1985 would be allocated to each precinct according to the proportion which its population bore to the total ward's population. Group quarters counts would

⁶³568 F.Supp. 1012, 1015 (d. Mass. 1983).

then be included in the appropriate wards and precincts. The Commission decided, however, that the household survey data contained in the BRA reports for 1980 and 1985 was too crude for a statistically accurate ward and precinct breakdown. While the BRA surveys measure citywide housing patterns accurately, they lack accuracy when used to measure population change at the planning district level. The surveys are not designed for such detailed purposes, and the sample size within each district is not large enough to ensure accuracy in measuring population growth between surveys.

The Commission has decided that the most appropriate method for determining the number of inhabitants in each of the City's 22 wards is to measure the percentage of growth in each of the 22 wards between 1980 and 1985. On the basis of this percentage change, the amount of the City's overall growth between 1980 and 1985 will be allocated according to each ward's percentage increase between 1980 and 1985, based on the City's 1985 census return.

The Commission has calculated the correct census population for the City on January 1, 1985 to be 601,095. This is an overall increase over the 1980 federal census of approximately 65% of the increase measured by the City. Thus, to allocate the growth to each ward, the measured percentage change in the ward's population between the 1980 Latino population allocation and the 1985 City census count is multiplied by 65% of the City's reported growth in its census return. This calculation is then made for each ward. The resulting allocations for each ward are set forth in Appendix E.

The Commission has determined that the percentage change in the precinct counts reported in the 1985 City census, unlike the ward counts, are not reliable. Unlike the ward counts, which are large enough to demonstrate growth accurately, even very slight undercounts and overcounts have a substantial effect on precinct populations. The Secretary's internal audit demonstrated precinct over and undercounts of hundreds of persons. The Commission has, therefore, decided to allocate the growth within each ward equally among the precincts by adding each precinct's share of the computed ward population to the 1980 federal census precinct counts as determined in Latino. The precinct totals are included in Appendix E.

V

RECOMMENDATION

Although the Commission's mandate relates only to the census count of the City of Boston, the Commission would like to point out that it is difficult to obtain a just apportionment of senatorial and representative districts in Massachusetts unless the population counts of each city and town are taken and reviewed uniformly, according to the same standards. The Massachusetts decennial census is required to be conducted according to the uniform guidelines set by the Secretary, but the actual headcounts and tabulation of inhabitants are conducted by each city and town, who use their own employees to take the census.



LAWYERS' COMMITTEE FOR CIVIL RIGHTS UNDER LAW
OF THE BOSTON BAR ASSOCIATION

294 WASHINGTON STREET • BOSTON, MASSACHUSETTS 02108 • (617) 482-1145

Steering Committee

Hugh R. Jones, Jr., Chairman
John Taylor Williams, Vice-Chairman

12 June 1987

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Dianne Wilkerson
Zipporah Batshaw Wiseman

Councillor Brian McLaughlin
Boston City Council
Chair, Committee on Redistricting
City Hall
Boston, MA. 02201

Dear Councillor McLaughlin,

Enclosed please find a copy of the correct distribution of the 601,095 1985 Estimate of the City of Boston. Dr. Yohel Camyd-Freixas has worked tirelessly each day and night to develop the correct distribution and he ought to be thanked for doing what the City Council should have done, given the Commission's analysis of the City's figures and methodology.

Unfortunately, a description of the methodology used by Dr. Camyd-Freixas will not be ready until Monday morning, at which time I will send it to you and Dr. Pierce at Northeastern University. I will send him the numbers today.

You will see that the bottom line is that the only change necessary when using the correct distribution formula is for a precinct to be transferred from District IV to District V. Nothing else has to change.

Certainly, maintaining stability in the City's district lines should be worth an extra day or two's wait while things are done correctly.

In any event, the responsibility for doing things correctly is the City Council's, and as concerned citizens, my clients have bent over backwards to assist your committee. We await the committee's and council's action.

Executive Director

Barbara R. Arnwine

Staff Counsel

Nadine M. Cohen
Alan Jay Rom

*Director, Project to Combat
Racial Violence*

Robert P. Sherman

Office Manager

Karen T. Horner

Sincerely,

Alan Jay Rom

APPORTIONING 1980-1985 POPULATION GROWTH

TO BOSTON WARDS AND PRECINCTS:

A Methodological Correction
to the Decennial Census Commission Report

Yohel Camayd-Freixas, Ph.D.

for the

Latino Political Action Committee

June 11, 1987

groups clustering in different areas, the Commission's 65% formula will also result in gross distortions in estimates of growth and thus of total 1985 population for City neighborhoods and districts. Moreover, use of the 65% formula significantly underestimates the numbers of people of color and their representativeness in the City, in spite of strong birth and fertility evidence to the contrary. The 65% formula also results in pronounced changes in the population figures for wards and precincts and in the relative size of districts which, if allowed, would necessitate extensive and in reality unnecessary redistricting and a dramatic shift of political boundaries in the City. To the extent that the over-concentration of population growth in several areas of the City as estimated by the 65% formula is spurious, then the resulting redistricting shifts would actually create new districts that are in actuality quite disparate in size, and the formula would thus result in a violation of the one person one vote rule.

AN ALTERNATIVE METHODOLOGY

As previously indicated, an alternative method to the 65% formula is to apply the Commission's second bottom-up formula (i.e., births, deaths, migration) to arrive at the ward and precinct population estimates. The approach commonly used by the U.S. Census Bureau, consists of again using the 1980 census of population as the baseline, and then accounting for all births, deaths, and migration into the area. Since both births and deaths data are kept by various racial-ethnic groups, it is possible to apply these data directly to each population group in each ward and precinct in the City. This refinement results in much more accurate estimate of population than approaches like the 65% formula since it doesn't assume that all groups or neighborhoods have grown at an equal rate. The most difficult element of this approach, the estimate of net migration, is now simplified by the Commission's official verification of a total population of 601,095 for 1985. That is, the Boston 1980 census figure of 562,994, plus births minus deaths, results in a figure which can now be subtracted from the Commission's total 601,095 to arrive at total net migration between 1980 and 1985.

The three components of this approach (i.e., births, deaths, and migration) are often incorporated into cohort survival formulas that are used to calculate population projections. This technique was used by the BRA in a recent study (Hafrey, Perkins, Ganz, and O'Brien, 1985) to calculate Boston population to the year 2000. The BRA used three alternatives (A, B, C) each applying different assumptions of growth, to calculate their projections. Of these, Alternative B, the highest projection, would result in a total population for Boston in 1985 of 604,000. Given that this is the only available

EXHIBIT 1

BIRTH/DEATH RATES FOR BOSTON

	<u>1980 DEATHS</u>	<u>1980 BIRTHS</u>	<u>NET POPULATION CHANGE</u>
WHITE	5085	3725	-1360
BLACK	868	2822	1954
HISPANIC	5	720	715
ASIAN & OTHER	70	287	217
UNKNOWN	1	117	116
TOTAL	6029	7671	1642

	<u>1981 DEATHS</u>	<u>1981 BIRTHS</u>	<u>NET POPULATION CHANGE</u>
WHITE	4877	3746	-1131
BLACK	803	2772	1969
HISPANIC	26	783	757
ASIAN & OTHER	70	343	273
UNKNOWN	0	369	369
TOTAL	5776	8013	2237

	<u>1982 DEATHS</u>	<u>1982 BIRTHS</u>	<u>NET POPULATION CHANGE</u>
WHITE	4695	3774	-921
BLACK	841	2853	2012
HISPANIC	29	672	643
ASIAN & OTHER	77	417	340
UNKNOWN	0	636	636
TOTAL	5642	8352	2710

	<u>1983 DEATHS</u>	<u>1983 BIRTHS</u>	<u>NET POPULATION CHANGE</u>
WHITE	4689	3749	-940
BLACK	828	2705	1877
HISPANIC	49	870	821
ASIAN & OTHER	68	440	372
UNKNOWN	1	546	545
TOTAL	5635	8310	2675

	<u>1984 DEATHS</u>	<u>1984 BIRTHS</u>	<u>NET POPULATION CHANGE</u>
WHITE	4632	3720	-912
BLACK	922	2848	1926
HISPANIC	49	846	797
ASIAN & OTHER	74	515	441
UNKNOWN	2	582	580
TOTAL	5679	8511	2832

	<u>1985 DEATHS</u>	<u>1985 BIRTHS</u>	<u>NET POPULATION CHANGE</u>
WHITE	4519	3780	-739
BLACK	997	2981	1984
HISPANIC	60	902	842
ASIAN & OTHER	81	453	372
UNKNOWN	1	801	800
TOTAL	5658	8917	3259

SOURCE: Boston Department of Health & Hospitals
Office of Health Statistics & Research

1985 projection that comes close to matching the Commission's 601,095 estimate, its underlying data were used as a starting point.

The first step in this process was to adjust BRA data. The BRA cohort survival technique used estimates of births and deaths after 1982. Since these estimates can now be replaced with actual data, a table was developed using births and deaths data by race from the Department of Health and Hospitals (see Exhibit 1). Exhibit 1 presents data for each year between 1980 and 1985. Data for 1985 is not relevant since the 1985 Decennial Census was supposed to take place in January 1985, and is thus only presented for trend purposes. Overall, the actual number of births was lower by about 5000 than the BRA estimate for this period. As is readily evident in Exhibit 1, net natural population change can be calculated by adding births and subtracting deaths. Here it can be seen that the White group, older on average and with the lowest fertility rate in the City, was losing population in the early eighties, although the rate of loss has been declining in recent years. Minority groups, on the other hand, younger on average and with higher fertility rates and within their peak child-bearing years on average, have been gaining population. These data can be applied to 1980 census data to begin to estimate the 1985 population (see Exhibit 2).

In Exhibit 2, the first step is to add 1980-1984 births to each group's 1980 population. The second step is to remove from each group 1980-1984 deaths. Since a number of births did not have a race group recorded, the net number of these "unknown" births were apportioned proportionate to the number of births to each group. A total of 40,857 actual births were added to the 1980 census total figure of 562,994, and actual 28,761 deaths subtracted. This yielded a total population of 575,090 in 1985, not counting net migration. Since the Commission established the 1985 total at 601,095, net migration consisted of 26,005. This estimate is about 4000 immigrants higher than the BRA estimates for the same period (Alternative B).

Attempts to apply the BRA's cohort survival technique to apportioning migration were not fruitful. BRA Research Director Alex Gans indicated that cohort survival analyses had not been conducted on Alternative B, and also were not available by race. Consequently, migration had to be apportioned using global estimates. The most important element here was to apportion the White population as accurately as possible; as the largest group, errors in estimating net migration for Whites would result in larger distortions of the population. The White group decreased 3.1% between 1970-80 in Massachusetts and by 25% in Boston during the same period due mostly to out migration from the City. However, all population estimates agree that the White population in Boston has been growing again since 1980. Most estimates by the BRA and others, when adjusted to a 1985 population of

EXHIBIT 2

1980-1985 BOSTON POPULATION CHANGE

POPULATION GROUPS						
	WHITE	BLACK	HISPANIC	ASIAN	OTHER	TOTAL
1 1980 CENSUS	384,451	122,102	36,430	16,073	3,938	562,994
2 1980-84 BIRTHS	18,714	14,000	3,891	1,608	394	40,857
2 1980-84 DEATHS	-23,978	4,262	-158	-288	-71	-28,761
1980-84 "UNKNOWN" NET BIRTHS 3	1,089	814	226	94	23	2,246
4 MIGRATION	10,000	6,501	6,501	2,601	402	26,005
1985 POPULATION	390,276	139,155	46,890	20,088	4,686	601,095
5 1980-85 CHANGE	1.515%	13.966%	28.713%	24.979%	18.994%	6.7676%

1. SOURCE: U.S. Department of Labor, Employment and Training Administration. 1980 Census Run 831110, Lawrence Berkely Laboratory, Report #3 "Social Indicators for Planning & Evaluation".
2. SOURCE: Boston Department of Health & Hospitals, Office of Health and Statistics & Research, June 1987. Total Birth data includes 2246 Births of "UNKNOWN" race (i.e., not identified), detailed in lower row. Asian and "other" Birth and Death data reported together, and apportioned in the table on the bases of population proportions (Asian=80.3208%, "other"=19.6792%).
3. Net "UNKNOWN" Births are calculated by subtracting 4 "UNKNOWN" Deaths from 2250 "UNKNOWN" Births, and apportioned to each group on the basis of their respective proportions of other Births.
4. Migration apportioned on the basis of 38.5% White, 25% Black, 25% Hispanic, 10% Asian, and 1.6% Other.
5. 1980-85 Percent Change is used to prepare population growth weight by group to 1985: Whites 1.01515, Blacks 1.13965, Hispanics 1.28713, Asian 1.24979, Other 1.18994, Average Total 1.067676.

601,095, predict a 1.4% or 1.5% White population growth. Accordingly, 10,000 Net migrants (38.5%) were apportioned to the White group for the 1980-1985 period. This resulted in a total White population growth of 1.515% for the five years. The remaining 16,005 Net migrants were minorities. At this point, two choices are possible: (1) we could use a White and an aggregate minority gross count to apportion population to districts, or (2) continue to develop apportioning formulas for each remaining population group. While we could stop here and calculate 1980-85 population growth for Whites and minorities, the resulting ward and precinct estimates would be more accurate if reasonable apportioning of growth is also conducted for other population groups. Yet this step is somewhat more subject to error since less work has been conducted in estimating the growth of these groups. Nevertheless, reasonable estimates that add known population information are generally more accurate than gross estimates. In this process, an important consideration for the Black Group is the immigration of large numbers of Haitians since 1980; for Hispanics it is both the rapid growth of Central American refugees, but also the rapid settlement of Hispanic migrants not in Boston as in the past but outside the Boston area; for Asians, the rapid growth in birth rates since 1980 suggests growing concentration of Southeast Asian immigrants (who are disproportionately in their twenties and thirties and thus in the peak childbearing years) in the Boston area. In all, apportioning of net migration as indicated in Exhibit 2 resulted in a somewhat faster growth rate for Blacks (13.9%) for the first half of the 1980's than the group had in the 1970's (20%); slower growth for Hispanics (28.7%) than during the 1970's (100.5%), and comparable growth for Asians (24.9%) who grew by 55% during the 1970's --aided to a large extent by strong Southeast Asian immigration during the late 1970's.

The total growth between 1980 and 1985 for each group was used to develop "growth weights" that could be applied to 1980 population data to estimate the 1985 ward and precinct population. The weights used were:

o Whites	1.01515
o Blacks	1.13966
o Hispanics	1.28713
o Asians	1.24979
o Other	1.18994

These weights, when multiplied by 1980 ward and precinct population, will result in estimates of 1985 population that together will add to the Commission's total estimate of 601,095. Yet, before doing this it is necessary to adjust available data on 1980 population by wards and precincts. Since the federal census uses census tracts and not precincts as its unit of measurement, the 1980 census population had to

Exhibit 3: Unadjusted BRA data for wards and precincts in 1980

WARD PRECINCT DISTRICT	1980 TOTAL	1980 BLACK	1980 WHITE	1980 HISPANIC	1990 ASIAN	1980 OTHER
::						
Total Ward 1	32795	268	31440	964	123	0
Total Ward 2	13313	26	13038	122	127	0
Total Ward 3	25490	851	20195	579	3865	0
Total Ward 4	27858	5857	19683	1243	1075	0
Total Ward 5	37060	1714	31275	1330	2741	0
Total Ward 6	15517	10	15342	88	77	0
Total Ward 7	20383	326	18871	1084	102	0
Total Ward 8	11758	5999	2735	2842	182	0
Total Ward 9	13039	9186	1334	2181	338	0
Total Ward 10	20311	5669	8809	5302	531	0
Total Ward 11	19426	7622	7899	3653	252	0
Total Ward 12	18446	16926	435	1016	69	0
Total Ward 13	17502	4605	10621	2151	125	0
Total Ward 14	29972	27358	716	1822	76	0
Total Ward 15	16959	5661	8762	2437	99	0
Total Ward 16	24690	349	23869	328	144	0
Total Ward 17	24709	12888	10359	1370	92	0
Total Ward 18	56917	16224	39110	1324	259	0
Total Ward 19	23527	1102	20051	2066	308	0
Total Ward 20	42172	208	41048	572	344	0
Total Ward 21	40424	2090	33954	2017	2363	0
Total Ward 22	29415	895	25618	1249	1653	0
Ward total	561683	125834	385164	35740	14945	0
Other	1311					
CITY TOTAL	562994					

WARD PRECINCT DISTRICT	1980 TOTAL	1980 BLACK	1980 WHITE	1980 HISPANIC	1980 ASIAN	1980 OTHER
::						
Total District I	60500	624	58170	1352	354	0
Total District II	63375	6860	46521	3255	6739	0
Total District III	62661	9539	49017	3719	386	0
Total District IV *	62626	51383	7602	3480	161	0
Total District V	60816	3845	54972	1496	503	0
Total District VI	63697	4695	51518	6659	825	0
Total District VII*	61524	40610	11668	8782	464	0
Total District VIII	63857	5767	52112	4120	1858	0
Total District IX	62627	2511	53584	2877	3655	0
District total	561683	125834	385164	35740	14945	0
Other	1311					
CITY TOTAL	562994					

1980 CENSUS: 562,994 122,102 384,451 36,430 16,073 3,938

Discrepancy: 1,311 3,732 713 - 680 -1,128

be apportioned to wards and precincts. The only available apportionment of these data was developed by the BRA. Yet scrutiny of the BRA data (see Exhibit 3) reveals a number of counting errors. The BRA ward and precinct data does not match the 1980 census; the BRA data reports 713 more Whites than the 1980 census counted in Boston, 3732 more Blacks, 690 fewer Hispanics, and 1128 fewer Asians. In some instances, the BRA reports more persons for the various racial groups than the total population for the precinct. While these errors are not large, they would be compounded when using weights to calculate 1985 population. For example, the 3732 Blacks in the BRA data that exceed the total Black population of Boston in 1980 according to the census, would increase to 4253 in 1985 after the weight formula is used. While we have calculated the 1985 population using these inaccurate data (see Appendix B), it is much more practical to eliminate these errors before calculating the 1985 population.

In order to do this, each ward and precinct population figure for 1980 was adjusted by a weight equal to the over or under count in the BRA estimates. These data are presented in Exhibit 4. Exhibit 4 starts out with a total 1980 population of 562,994 and ends up with a total 1985 population of 601,095 as indicated by the Commission. The details of population by ward and precinct for 1985 are enclosed in Appendix A. Appendix A provides all the necessary ward, precinct, and district data for a 1987 redistricting of the City.

IMPLICATIONS FOR REDISTRICTING

The general rule in redistricting is that district population must fall within 5% of the average for all districts. Given that the citywide district average for a population of 601,095 is 66,788, and that 5% of 66,788 amounts to +/- 3339, the lowest 1985 population allowable for a district is 63,449 and the highest is 70,127. As a result, only district 1 at 61,882 and district 5 at 62,592 violate this rule by having insufficient population size. Given that the largest districts are 2 (61,882) and 4 (69,307), it is quite easy to assign a few precincts from district 1 and thus achieve compliance with the district size rule. As a result, the extent of district boundary changes required by this 1985 population estimates is minimal, and far less disruptive than that which would have been required by the flawed 65% formula.

